Department of Civil Engineering, SoET
Baba Ghulam Shah Badshah University, Rajouri (J & K)

Syllabus for PhD. Entrance Test (2025-26)

Engineering Mathematics: Definitions of probability and sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Poisson, Normal and Binomial distributions. Numerical Methods: Numerical solutions of linear and non-linear algebraic equations, Integration by trapezoidal and Simpson's rule, single and multi-step methods for differential equations. Analytic functions, Cauchy's integral theorem, Taylor and Laurent series.

Engineering Mechanics: System of forces, free-body diagrams, equilibrium equations; Internal forces in structures; Frictions and its applications; Centre of mass.

Solid Mechanics: Bending moment and shear force in statically determinate beams; Simple stress and strain relationships; Simple bending theory, flexural and shear stresses, shear center.

Structural Analysis: Statically determinate and indeterminate structures by force/energy methods; Method of superposition; Analysis of trusses, arches, beams, cables and frames; Displacement methods: Slope deflection and moment distribution methods; Influence lines; Stiffness and flexibility methods of structural analysis.

Construction Materials and Management: Construction Materials: Structural Steel – Composition, material properties and behavior; Concrete - Constituents, mix design, short-term and long-term properties. Construction Management: Types of construction projects; Project planning and network analysis - PERT and CPM; Cost estimation.

Concrete Structures: Working stress and Limit state design concepts; Design of beams, slabs, columns; Bond and development length; Prestressed concrete beams .

Steel Structures: Working stress and Limit state design concepts; Design of tension and compression members, beams and beam-columns, column bases; Connections - simple and eccentric, beam-column connections, plate girders and trusses; Concept of plastic analysis - beams and frames.

Geotechnical Engineering: Three-phase system and phase relationships, index properties; Unified and Indian soil classification system; Permeability - one dimensional flow; Seepage through soils – two-dimensional flow, flow nets, uplift pressure, piping, capillarity, seepage force; Principle of effective stress and quicksand condition; Compaction of soils; One-dimensional consolidation; Shear Strength, Mohr’s circle, effective and total shear strength parameters; Stress-Strain characteristics of clays and sand; Stress paths.

Department of Civil Engineering, SoET
Baba Ghulam Shah Badshah University, Rajouri (J & K)

Fluid Mechanics: Properties of fluids, fluid statics; Continuity, momentum and energy equations; Potential flow, Laminar and turbulent flow; Flow in pipes, pipe networks; Boundary layer concept; Lift and drag.

Hydraulics: Forces on immersed bodies; Flow measurement in channels and pipes; Dimensional analysis and hydraulic similitude; Channel hydraulics - specific energy, critical flow, hydraulic jump, uniform flow, gradually varied flow and water surface profiles.

Hydrology: Hydrologic cycle; Precipitation; Evaporation; Evapotranspiration; Watershed; Infiltration; Unit hydrographs; Reservoir capacity; Flood estimation and routing; Groundwater hydrology; Application of Darcy's Law.

Irrigation: Types of irrigation systems and methods; Crop water requirements - Duty, delta, evapotranspiration; Gravity dams and spillways; Lined and unlined canals; Design of weirs; Cross drainage structures.

Environmental Engineering: Water quality standards; Water treatment; Sewerage system design; Wastewater treatment; Effluent discharge standards; Sludge disposal; Solid waste management.

Transportation Engineering: Geometric design of highways and railways; Airport runway design; Highway materials; Design of flexible and rigid pavements using IRC codes.

Model Questions

Q1. The method of superposition can be applied to analyze beams and frames when:
A. the structure is statically determinate only
B. the material follows nonlinear stress-strain behavior
C. the structure behaves elastically and obeys Hooke's law
D. large deflections occur

Q2. The property of fresh concrete where water in the mix tends to rise to the surface while placing and compacting is called:
A. Segregation
B. Bleeding
C. Bulking
D. Creep

Q3. Which of the following represents the continuity equation for a steady, incompressible fluid flow through a varying cross-sectional area:
A. $A_1V_1 + A_2V_2 = 0$
B. $A_1V_1 + A_2V_2 = \infty$
C. $A_1V_1 > A_2V_2$
D. $A_1V_1 = A_2V_2$